SYSTEMS FOR GENERATING SHORT-PULSE LASER LIGHT

ABSTRACT OF THE DISCLOSURE

The present invention has the following objectives:

(1) to realize a compact, high-pulse-energy power and short-pulse laser using an amplification system that is theoretically free from heat generation;

(2) to perform automatic correction of wave planes by generating Raman light in the presence of thermal distortion;

(3) to realize a compact system that can produce shorter pulses without using the pulse extender, pulse compressor and other devices used in CPA that are bulky and which require precise adjustments.

To attain these objects, the present inventors developed the following techniques:

a) a system for compressing sub-nanosecond laser pulses by the tandem SBS method using the stimulated Brillouin scattering effect;

b) a system for multi-stage compression of pulses to a duration as short as the life of phonon (sub-picoseconds) using the stimulated Raman scattering effect;

c) a method of introducing seed pulses by the half-waist reflection method and the tandem crystal method for the purpose of reducing the simulated Raman scattering effect;

d) a pulse compressing system incorporating the step of shortening the pulse duration by the generation of second and third harmonics.

No optical data required for the development of these

techniques were available before the accomplishment of the present invention. Hence, the present inventors found by experiment the limit on optical damage and the threshold intensity of the pump laser for the generation of optical scattering in a laser field that was intense but not so strong as to cause channeling due to self-focusing.